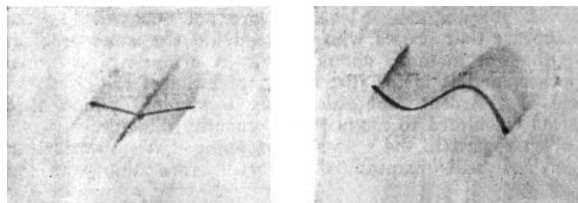


jointly, they generally are not all in one plane of vibration; in other words, one or more appear in a plane which is normal to that of the others, and this can always be secured by a manipulative device. The paths described by any point on the string would in such circumstances be curved figures identical with, or analogous to, the well-known figures of Lissajous.



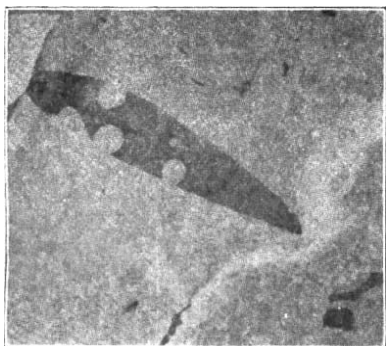
I send two photographs (Figs. 1 and 2), each only 3 cm. by 2 cm., showing a short length of the string with a brilliant point in the middle of it, when executing such oscillations. The curves shown in them are only two out of a large number that I have observed and photographed, and can be recognised to be both compounds of the first three harmonics in the series mentioned above. It is difficult at first mentally to picture the process by which a tuning-fork executing normal oscillations maintains a string permanently in an oscillation of the type shown in the photographs.

C. V. RAMAN.

Post-Box 59, Rangoon.

A Tertiary Leaf-cutting Bee.

ALTHOUGH fossil remains furnish us with abundant evidence of the antiquity of many structural characters in animals, and permit us to surmise a like antiquity of certain habits, it is not often that we find preserved the proofs of the latter. The leaf herewith figured, collected in the Miocene shales of Florissant, Colorado, by two of my students, Messrs. Duce and Rusk, shows the work of a leaf-cutting bee. Evidently the specialised and peculiar habit of cutting out pieces of leaf to use in forming the nest was as highly developed, perhaps, a million years



ago as it is to-day. The bee itself has also been obtained, and described as *Megachile praedicta*, Ckll., 1908.

T. D. A. COCKERELL.

University of Colorado, January.

Tests for Colour-blindness.

WITH reference to the article on colour-blindness in NATURE of January 27, I should like to point out that advocates of the Holmgren test assume that a person who fails with the wools will fail with coloured lights, and that a person who appears normal when examined with the wools is normal when examined with coloured lights. This was the first point which I proposed to settle when I took up the subject of colour-blindness. I found many varieties of colour-blindness, unimportant from a practical point of view, that failed, and many dangerous varieties of colour-blindness that passed this test. Many absolutely normal-sighted persons are also rejected by the Holmgren test; Germany has officially discarded it for this reason.

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Within the last fortnight I have examined two dangerous varieties of colour-blindness that passed the Holmgren test with the greatest ease; in fact, the most punctilious examiner would not have suspected that there was anything wrong with their colour sense, but both made the grossest errors with my lantern. The first case could not tell between the white, green, and red lights on trams at a distance of about one hundred yards.

The two factors which seem to be generally overlooked are the great effect of diminishing the intensity of a light in certain cases and the importance of taking into account the size of the image on the retina, that is to say, the number of cones stimulated. A few days ago I examined a normal-sighted man who had failed with the Holmgren test. He put definite browns with the green skein. When I found that he was normal I asked him to name the wools, and he did so correctly. I then asked him why he put browns with green. He replied, "I have been told I am green-blind, and I thought that there was green in those browns which I could not see." When I told him he was quite normal he had not the least difficulty with the test.

F. W. EDRIDGE-GREEN.

Hendon, January 31.

Observations of Halley's Comet.

READERS of NATURE may perhaps be interested to know that Halley's comet can now be seen with a good pair of field-glasses. Careful estimates make it almost exactly equal to an eighth-magnitude star.

The best form of instrument is a high-power Galilean binocular, and though the comet does not present any interesting features with such small optical aid, it can be distinctly seen, and distinguished from a star by its nebulous appearance. It is, of course, necessary to know the comet's position fairly exactly before attempting to pick it up. The following are a few of my notes:—

- 1910, Jan. 8, 12 and 13, Comet faintly seen in 1-inch finder
Mag. ± 9.0 .
" " 15d. 8h. 45m. Faintly seen in binocular.
" " 30d. 8h. om. Steadily seen in binocular.
" Feb. 3d. 8h. om. Found with binocular, eighth magnitude (estimate 8.1).

P. M. RYVES.

Zaragoza, Spain, February 5.

Records of the Earthquake of January 22.

DR. CHREE has noted in NATURE of February 3 the mechanical effect upon the Kew declination-magnetograph by the earthquake of January 22. Any confirmation of movements of this kind is of considerable value, and I therefore send you this notice of the corresponding effects upon the Stonyhurst magnetographs. All the three elements were markedly affected; the declination magnet was set in oscillation at 8h. 56m. a.m. for five minutes, the vertical force magnet also at 8.56 for about two minutes, and the horizontal force magnet was the most disturbed, commencing at 8.52 and lasting for quite ten minutes, with a maximum displacement of 3.5 mm. against the force of the torsion balance, but it is not clear that there was any swing on the opposite side of the normal position.

The origin of the earthquake remains apparently unknown, but, judging by our Milne seismograph, it was much nearer to us than any of the thirty earthquakes registered here since the instrument was fairly started on active service on July 1, and the proximity may account for the much greater swing of the boom. From the beginning I have claimed the eastern border of the Atlantic for the true region.

Prof. Milne's seismographs at Shide have shown an enduring displacement which has not been produced here.

WALTER SIDGREAVES.

Stonyhurst College Observatory, February 5.

The Mendel Journal.

IN NATURE for December 30, 1909 (p. 252), there appeared a review of the first number of the *Mendel Journal*, by "E. H. J. S." He also, in the same review, reviewed the current issue of *Biometrika*. I pass no comment upon the questionable fairness of having two

such diametrically opposed journals reviewed by the same person, who, if we may judge by certain statements in the review, is himself a biometrician, or very friendly disposed towards them. I am alone concerned in dealing with your reviewer's misinterpretation and imperfect reading of certain articles of mine written under the *nom de plume* of "Ardent Mendelian." He accuses me of "adopting a tone calculated to be offensive to biometricians," and as an instance he cites the following sentence:—"We may further infer, therefore, that the discipline of the army¹ is very severe, and perhaps this may throw some light upon the constant reappearance of the figure 0.5 in relation to the size of some of its artillery equipment."² Your reviewer interprets this as a "serious charge of faking" directed against biometricians. I do not know upon what plan he writes his reviews or whether he reads sufficient of the article he reviews to grasp properly its tone and meaning. Nothing was farther from my intention than to impute want of integrity to any biometrician, notwithstanding some bad examples which they themselves have set, when they deal with Mendelians. Had your reviewer but read a few lines lower down (p. 160) he would have found the following chivalrous sentence, describing them:—

"In some respects it is a very fine army, and it is certainly an imposing one upon parade. It is led, officered and manned by men of transcendent intellect, of whom any country may be proud." And again, on p. 185, in commenting upon Dr. Raymond Pearl's work, I wrote:—"Could we assent to his methods we might commend his results; we can admire his skill as a workman, while lamenting his tools." Then on p. 164, where I criticised the particular way in which Prof. Karl Pearson had set certain questions to a correspondent, I wrote:—"We do not, of course, for one moment suggest that Prof. Pearson desires to be unfair, or that the nature of the question has in the smallest degree influenced the answer. We accept the evidence quite unreservedly."

These quotations are sufficient to show that the articles written by "Ardent Mendelian" were couched in the most courteous tones, and contained even chivalrous acknowledgments of the high ability and integrity of those whose methods of investigation and conclusions he felt bound to criticise. None but the most tender conscience could have misconstrued the particular sentence complained of into a charge of "faking" when the context of the article was taken into account; for how could "any country be proud" of men who "faked"? Your reviewer either could not have read any more of the article than the sentence he quoted, or he must have approached his work in a peculiarly prejudiced frame of mind. I do protest against the unfairness of such treatment. When a writer has been deliberately careful to adopt a courteous tone, it is not fairness to disregard his context—to quote a particular sentence and then to misconstrue it.

This sentence was never intended to convey a charge of "faking," and it simply alluded to the biometrical method of definition in constituting a sort of guide when dealing with investigations in certain problems. Had I intended to impeach the probity of any biometrician my language would have been unmistakable. If your reviewer had but recalled to mind the earlier works of biometricians, he would have remembered a generalisation called "homotyposis," and he would have further recalled that the homotypic average of correlation turned round the figure 0.5. He would also have remembered that this figure was reached by a remarkable process of excluding the parts or organs which were either "too like" or "too different," and this process was based upon an attempted definition by Prof. Pearson—who in my article is alluded to as the Field Marshal—in which he hoped to define the differences between variation and differentiation. This correlation figure of 0.5 was therefore reached by the exclusion of all parts or organs which would otherwise naturally tend to raise or lower the figure, and it was to this process of working by definition and exclusion, as defined by the "Field Marshal" that I alluded when I wrote the sentence which has been, I cannot but help thinking, carelessly misconstrued.

¹ Biometrical.

² It should be mentioned that the article was advisedly written in terms of martial imagery.

In conclusion, I can only ask that your readers will read the articles and judge for themselves of their courteous tone and fair treatment.

"ARDENT MENDELIAN."

"ARDENT MENDELIAN" is correct in supposing that I am a biometrician; but I am, at the same time, a believer in Mendelism, and I hold that the main aims of the *Mendel Journal* and *Biometrika* are not opposed. To me it appears that people who are studying the same problem by different methods should work in sympathy with one another, and it is for just this reason that I criticised the tone of "Ardent Mendelian," as I was of opinion that it was calculated to make such sympathy difficult.

With regard to the sentence beginning "We may further infer," I still maintain that my interpretation was the most natural one, even after making every allowance for the context; but I accept with the greatest pleasure the author's correction.

E. H. J. S.

THE INTERPRETATION OF TOPOGRAPHIC MAPS.¹

THE evolution of maps, and of our ideas regarding their use and function, might be made the subject of an interesting and profitable study. The main object of the early cartographers was to plot down with all attainable accuracy the relative size and position of countries, of towns or of smaller units, and to indicate such natural features as mountains and rivers; roads were added later, and, as the necessity became more evident and geodetic methods improved, the scale was enlarged, while the increasing accuracy permitted additional and minuter details to be introduced. The organisation of national cadastral surveys gave us at last the large-scale contoured maps that, with or without orographic colouring, constitute the highest expression of the map-maker's science.

Upon the basis of the topographic maps, special features of distribution and of activities, such as direction of winds and currents, may be shown, and lines of equivalent development of artificial and natural phenomena, such as isobars and all the other "isos," may find expression. Of these the topographic map takes no account; there has, however, with progress of geographical and geological methods, come a new way of looking at and interpreting a topographic map, so that it is made to disclose not only much that is hidden from the ordinary user, but even more than was recognised by the surveyor who made it. The old reading of a map was an appreciation of the morphology of a piece of country regarded as a statical phenomenon, without reference to either its internal anatomy, its physiology, or the mode and causes of its development; it asked for no reason. The new method seeks dynamical interpretations of all geographical phenomena, and asks how, and why, things are as they are.

A range of hills is no longer simply an elevated tract of country, delineated upon a map by certain contour lines, but it becomes the expression of facts of structure produced in a particular way, out of materials of a particular kind, by agencies the nature of which can often be inferred directly from the data supplied by the topographic map itself. In like manner, the history of a river-system, the development and interactions of its parts, and the climatic vicissitudes that have affected its drainage basin can be deduced from the map by the familiar exegetical device of reading the spirit of the commentator into the text. The department of geographical study, seeking among other objects the cultivation of this faculty,

¹ "The Interpretation of Topographic Maps." By R. D. Salisbury and W. W. Attwood. Pp. 84+cxx plates. Department of the Interior, U.S. Geological Survey, Professional Paper, 60. (Washington: Government Printing Office, 1909.)